The 2006 Rocky Flats Closure Project Baseline

A Brief Overview

On May 21, 1999, Kaiser-Hill submitted the 2006 Rocky Flats Closure Project Baseline (2006 Baseline) to the Department of Energy (DOE) for review. This document was submitted at the request of DOE. The 2006 Baseline details the work scope, cost, and schedule for completing the accelerated closure of Rocky Flats by December 31, 2006, at a cost of $6.75 billion. In all, the 2006 Baseline comprises more than 20,000 pages and covers some 11,000 individual work activities necessary to achieve a safe closure.

The scope of work and end state conditions for the 2006 Baseline are similar to the current 2010 Baseline. However, the 2006 plan represents a four-year acceleration of schedule and a reduction in cost over the current 2010 plan. The largest benefit from accelerated closure is an early reduction in the potential risks to the workers, the public, and the environment posed by the Rocky Flats Site. Another very important outcome will be the savings of hundreds of millions of dollars in taxpayer money. These benefits will accrue without sacrificing the quality of the closure.

The 2006 Baseline was created using industry-standard project planning practices and tools, such as the Primavera Project Planner.

The 2006 Baseline is the proposed plan for closure; it is not, however, a decision document. Many of the actions proposed through this plan will include extensive public involvement in the decision-making process.

Closure Planning History

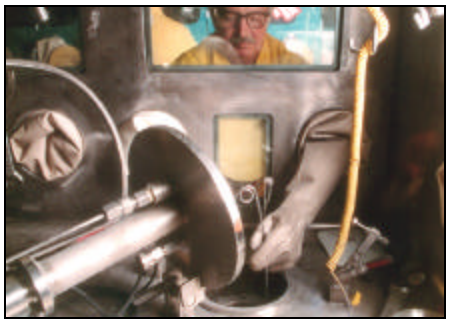
Early plans for the closure of Rocky Flats contained in the DOE's March 1995 Baseline Environmental Management Report called for the site to be closed by the year 2060 at a cost in excess of $37 billion *(Note: The 1995 $37 billion estimate is not adjusted for inflation. If adjusted for inflation the cost estimate would be more than $90 billion. The $6.75 billion 2006 Baseline is adjusted for inflation).* Accelerated closure planning efforts began in July 1995 and by June 1997, DOE and Kaiser-Hill had committed to a projected closure date of 2010. However, DOE and Kaiser-Hill both remained convinced that further improvements could be made and in August 1997, then Secretary of Energy Federico Peña challenged Rocky Flats to achieve closure in 2006. The 2006 Baseline submittal represents the site's response to that challenge.

Project End State

The Rocky Flats Closure Project will culminate in the closure of Rocky Flats and more than 6,000 acres of land that can be made available for future beneficial use, primarily as open space. The site will be cleaned

to levels set in the Rocky Flats Cleanup Agreement (RFCA), signed July 1996 by Colorado Department of Public Health & Environment, U.S Environmental Protection Agency and DOE. Under the RFCA Vision, the project end state is one in which:

- All Special Nuclear Material (SNM) is shipped to offsite repositories.



Residue Salt Stabilization

- All radioactive wastes are shipped off site for disposal.
- All facilities are demolished.
- Environmental remediation meets requirements for future open space and limited industrial uses.
- Water leaving the site meets all applicable standards for perpetuity.

Work Elements

The work activities necessary to achieve the end state described above can be broken down into four major areas: SNM Stabilization and Packaging, Facility Deactivation and Decommissioning (D&D), Environmental Remediation, and Offsite Shipment of SNM, Waste and Other Materials. In addition, safety, security, and environmental compliance elements are integrated throughout the project.

Building 779 D&D

SNM Stabilization and Packaging - All SNM must be placed in a stable form and packaged for long-term storage or disposal. This includes the packaging of more than 2,000 containers of plutonium metals and oxides; the processing and/or packaging of more than 100 tons of plutonium byproducts called residues; and draining of plutonium and uranium liquids from 49 process piping areas or liquid systems in Buildings 371 and 771.

Facility D&D - More than 700 structures comprising some 3.5 million square feet must be demoloished and removed from the site. Structures range from environmental monitoring stations to uncontaminated office trailers to highly contaminated former plutonium production facilities. Most of the effort will lie in decontaminating and decommissioning the six major plutonium buildings that total nearly 1 million square feet. Before these buildings can be taken down, site workers must remove the plutonium that is held up in gloveboxes, pipes, ducts, and equipment in these facilities (referred to as plutonium holdup). Public discussions regarding the possible use of clean rubble as on site fill are currently taking place.

East Trenches Plume

Low-Level Waste Shipment

Environmental Remediation - Radioactive and chemical contamination exists in soil and small areas of groundwater. Environmental remediation involves removing or containing contamination in the environment to eliminate potential public exposure consistent with future land uses. Twenty-four areas of contamination have already been addressed and approximately 100 additional areas of suspected environmental contamination must be addressed prior to site closure.

Offsite Shipment - Rocky Flats must ship its nuclear materials and wastes off site for disposal. This will involve the shipment of many tons of plutonium metals and oxides to the Savannah River Site, and many tons of uranium to the Oak Ridge Site. All plutonium pits have already been shipped to Pantex and other DOE facilities. Commonly referred to as the "triggers" for nuclear weapons, pits consist of hollow shells of nuclear material that when imploded by high explosives provide the energy to initiate a thermonuclear reaction. In addition, an estimated 15,000 cubic meters of transuranic waste must be shipped to the Waste Isolation Pilot Plant (including many tons of plutonium residues) and approximately 140,000 cubic meters of low-level and 60,000 cubic meters of low-level mixed waste will go to licensed disposal facilities. Some of the site's plutonium residues will also be shipped to other DOE sites for processing. Some waste streams do not have an

Worker Monitoring

identified receiver site at this time and disposal options will have to be developed for those wastes. More than 600,000 items of property, 3.08 million classified documents, and more than 24,000 containers of chemicals must also be dispositioned.

Integrating Safety, Security, and Environmental Compliance - Safety, security, and environmental compliance are tightly woven into every aspect of the Rocky Flats Closure Project 2006 Baseline. Safety is incorporated through the site's Integrated Safety Management System into every single work activity at the site, and all work planning efforts include an environmental review of the work. The Kaiser-Hill Team will maintain all security necessary to protect the nuclear materials for as long as it remains at this site.

Closure Acceleration Approach

The 2006 Baseline identifies the schedule and logic to close the site four years earlier than the current 2010 Closure Baseline. To do so, the 2006 Baseline relies on a strategically different approach to site closure.

The two key principles followed are: 1) safely reducing the urgent risks first and, 2) performing work in a sequence that reduces or eliminates operations, maintenance, and security

2010 Versus 2006

The following table summarizes some of the key differences between the 2010 Baseline and the 2006 Baseline.

2010 Baseline	**2006 Baseline**
SNM stabilization and offsite shipment to be completed in 2004.	SNM stabilization and offsite shipment will be completed in 2002 to facilitate early closure of the Protected Area by October 31, 2002.
Treatment and plutonium recovery operations to be installed and performed at Rocky Flats.	The majority of residues will be packaged in the pipe component in accordance with the Safeguard Termination Limit variance and shipped to WIPP for disposal and the remaining residues will be safely packaged and shipped to other DOE sites for disposition.
No focus on early holdup removal.	Plutonium holdup removal will be accelerated to enable early closure of the Protected Area and to allow the material to be packaged in the plutonium packaging system.
SNM and D&D activities to be performed in sequence with environmental restoration and offsite shipment spread throughout the project.	SNM stabilization and plutonium facility D&D are performed in parallel, shipment activities are spread throughout, and environmental restoration is deferred to the out-years.
Major size reduction of equipment to occur in each individual plutonium building.	A central size-reduction facility will be created in the Protected Area to perform the size reduction of large contaminated equipment more efficiently.
Status quo waste shipping and infrastructure.	Bulk waste containers and multiple shipping docks will be used to improve shipping efficiency and, where possible, waste will be shipped from the point of origin to avoid onsite waste movements and interim storage costs.
Operations based on a single 9-hour work shift and existing processing lines.	Multiple work shifts and increased number of processing lines will be employed.
The capped area was much larger, was to include the 300-area, and was based on a different design that took longer to construct.	The cap size is reduced by eliminating the cap for the 300-area buildings. A new cap design is proposed that will provide better protection and take less time to construct.
Capability for performing required measurements of plutonium in SNM and some wastes would not meet the demands of accelerated closure.	The capability for performing required measurements of plutonium in SNM and some wastes is increased through additional assay equipment and a sitewide scheduling system.
Ship clean building rubble to offsite sanitary landfill.	Clean building rubble will be recycled and used as fill on site to avoid the costs of disposing of it as sanitary waste and to avoid the costs of bringing in fill from off site. Final determination of this option depends on stakeholder agreements.

costs (commonly referred to as "mortgage" costs) as early on in the project as possible. Key to the 2006 approach is the early focus on closure of the site's secured area, known as the Protected Area. Closing the Protected Area as soon as possible means that the high costs associated with the security and maintenance of this area can be redeployed to accelerate other closure activities. Early closure of the Protected Area also will allow for ease of access and more efficient work processes during the D&D of the major plutonium buildings.

The Protected Area closure will be facilitated through the accelerated removal of all special nuclear materials and the majority of the plutonium holdup. In addition, D&D and SNM risk reduction activities will be performed simultaneously rather than sequentially. This supports both the risk reduction and mortgage reduction principles.

Most environmental remediation work and the D&D of noncontaminated and lesser contaminated facilities will be deferred to later in the project to allow resources to be focused in areas that result in the greatest reduction in risks and mortgage costs.

The technical approach for the 2006 baseline is governed by the following seven key strategies:

- Do work safely through the project-wide incorporation of the Integrated Safety Management System.
- Eliminate the highest risks first.
- Reduce site mortgage costs to fund acceleration of closure activities.
- Focus the highest management attention on completing those activities and tasks that are on the critical path – those having the greatest potential impact on project schedule and cost.
- Maximize work efficiencies and

TRUPACT-II

effectiveness.

- Develop a core competency in the planning and preparation for hazardous work activities to increase project planning efficiency and effectiveness and lay firm ground for expedited approval of new work.
- Seek out existing approaches and technologies that can be modified for innovative applications at Rocky Flats to perform work with increased safety and efficiency.

Key Assumptions

Assumptions are used in project planning to allow development of detailed project plans, while taking into account uncertainties and factors beyond the project's control. The 2006 Baseline is predicated on 35 key assumptions that are summarized below. The 2006 baseline assumes that:

- The end state will not be substantially changed from the current 2010 Baseline.
- The regulatory framework for the project – including the RFCA – will be followed and remain essentially unchanged.
- Receiver sites and transportation for SNM, waste, and other materials will be available as needed and an adequate supply of certified shipping containers and transport vehicles will be available.
- Current cost allocation procedures will remain in place, costs of treatment and disposal of wastes will not vary significantly, and Rocky Flats will continue not to bear the costs of transporting and dispositioning nuclear materials and transuranic wastes. Site funding levels will be sufficient to allow for accelerated closure.
- Key management agreements will remain substantially unchanged throughout the project. This includes the current contracting mechanism between DOE and Kaiser-Hill and current union labor agreements.

Some level of change in certain assumptions could be accommodated while still achieving a safe closure by the end of 2006. Changes in multiple assumptions or a dramatic change in a key assumption would likely affect the overall closure project schedule and cost.

Project Cost

Cost estimates for the 2010 Baseline ranged from $7.3 billion for a top-down estimate to $8.4 billion based

Building 707 Room Conversion

upon bottoms-up estimating. A top-down estimate is a high-level conceptually based estimate, whereas a bottoms-

up estimate is a more detailed estimate
based upon thorough input from project
managers for the functional areas. Both the bottoms-up and top-down estimates for the 2006 Baseline is $6.75 billion. This is a $1.65 billion improvement over the comparable bottoms-up estimate for 2010. However, Kaiser-Hill is committed to achieving a total project cost of $6.2 billion through additional productivity improvements, efficiencies, and cost reductions. Although the 2006 Baseline has been submitted, Kaiser-Hill continues to work on decreasing project costs and reducing required annual funding.

Work Force Projections

As the closure of Rocky Flats progresses, the amount of people necessary to
complete the work will also change. For instance the completion of residue processing, plutonium packaging, and the closure of the Protected Area in 2002 will likely correspond with a decrease in the overall site population. Part of the project management strategy is to the greatest extent possible to transfer workers from completed tasks to other work activities such as D&D which will be gearing up for major plutonium building D&D about that same time in the project. In addition, the site is developing resources and programs to assist employees in transitioning from Rocky Flats once their part of the closure mission is completed.

Building 123 Demolition

Closure Project Progress to Date

Trench 1

The Rocky Flats Closure Project can be viewed as a 10-year project that officially began in 1996 in conjunction with the generation of the site's first Ten-Year Plan. But the groundwork for accelerated cleanup of Rocky Flats actually began on July 1, 1995, with the Department of Energy's implementation of its new performance-based integrating management contract and early Kaiser-Hill accelerated planning efforts known as Interim End State and Accelerated Site Action Project.

Since July 1995, site workers have made record accomplishments in the areas of waste shipping, environmental cleanup, nuclear materials stabilization and facility deactivation and decommissioning. As the 2006 Baseline was being finalized in May 1999, the Rocky Flats Closure Project was approximately one-fifth complete. This work was accomplished while registering across-the-board improvements in safety and site security. Site workers have:

- Drained and stabilized more than 14,000 liters of dangerous plutonium and uranium solutions from dozens of major tanks.
- Drained and removed 17 of 49 piping systems in Buildings 371 and 771.
- Processed or repackaged 24,151 of 106,000 kilograms of plutonium residue wastes.
- Removed 79,204 square feet of building space, or 2.2 percent of the 3.5 million square feet necessary for closure – including two radioactively contaminated facilities: Building 889 and Building 123.

Waste Shipment Loading

- Exceeded glovebox removal milestones set for Building 779 last year by more than doubling the expected rate of accomplishment by removing
  83 of a total of 133 gloveboxes versus a performance requirement of 40 gloveboxes.
- Cleaned up
  six of the
  top-10 risk
  environmental contamination areas at Rocky Flats, including the removal of 30 tons of pyrophoric depleted uranium from Trench 1 – the most dangerous and complex cleanup project performed to date at the facility.
- Doubled the volume of waste shipped in each year since 1995 and, for the second year in a row, Rocky Flats is leading all other DOE sites in the safe shipment of low-level and low-level mixed wastes.
- Completed the shipments of plutonium pits to Pantex and other DOE sites. Shipments of plutonium metals and oxides are not scheduled to begin until 2000.
- Shipped to Oak Ridge approximately
  80 percent of enriched uranium
  for which decontamination
  technology exists.
- Shipped 14,617 cubic meters of
  low-level mixed waste and 6,420 cubic meters of low-level waste for
  11 percent of the estimated volumes required for the overall closure project.
- Dispositioned 119,000 of 628,000 items of property and 3 million of
  3.08 million items of classified matter.

Conclusion

The 2006 Baseline represents the most detailed planning effort to date for Rocky Flats and is the most comprehensive, sitewide closure project baseline created for a major DOE site. It contains a fully integrated work scope and logic to achieve closure by the end of calendar year 2006. The closure of Rocky Flats will be immensely challenging under any time frame; however, the potential benefits in terms of early risk reduction and savings in taxpayer dollars are great. The 2006 Baseline brings the site another step closer to achieving its goal of safe, accelerated closure fully compliant with all regulatory requirements.